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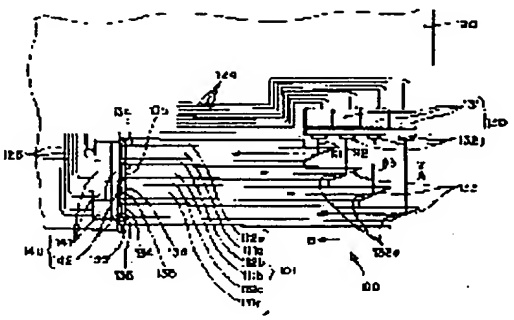
(54) OPTICAL BUS AND INFORMATION PROCESSOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an optical bus capable of reducing crosstalk and electromagnetic noise, easily performing aligning and freely detaching and attaching a circuit board and an information processor for performing a signal processing by using the optical bus.
SOLUTION: This optical bus 101 is provided with a signal light incident part 133 in charge of the incidence of signal light, a signal light emission part 134 in charge of the emission of the signal light and layer-like waveguides 111a, 111b, 111c,... for spreading the signal light made incident from the signal light incident part 133 and propagating it to the signal light emission part 134. The signal light incident part 133 guides the light made incident from an incident direction A crossed with a surface where the layers of the waveguides 111a, 111b, 111C,... are spread into the waveguides 111a, 111b, 111C,... and the signal light emission part 134 emits the signal light from the end edge 136 of the layers of the waveguides 111a, 111b, 111c,....



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CLAIMS

[Claim(s)]
[Claim 1] The signal light incidence section which bears the incidence of signal light, and the signal light outgoing-radiation section which bears the outgoing radiation of signal light, The optical bus characterized by being the optical bus equipped with the stratified waveguide which diffuses the signal light by which incidence was carried out from the aforementioned signal light incidence section, and is spread among the aforementioned signal light outgoing-radiation section, and being what draws the light by which incidence was carried out from [where the aforementioned signal light incidence section intersects the field where the layer of the aforementioned waveguide spreads] incidence in this waveguide.
[Claim 2] The optical bus according to claim 1 characterized by superimposing two or more layers on the aforementioned waveguide, and changing.
[Claim 3] The optical bus according to claim 2 characterized by being formed stair-like and changing so that the waveguide located in an upper layer side rather than the waveguide located in this lower layer side may permit the transit of signal light by which incidence is carried out to the waveguide located in this orientation lower layer side of incidence among two or more signal light by which incidence of the aforementioned signal light incidence section is carried out to each waveguide on which two or more layers were superimposed from [aforementioned] incidence.
[Claim 4] The optical bus according to claim 2 characterized by having the transit way where the aforementioned signal light incidence section was drilled in the waveguide located in the aforementioned orientation upper layer side of incidence, and which passes the signal light by which incidence is carried out to the waveguide located in this orientation lower layer side of incidence.
[Claim 5] The information processor according to claim 2 characterized by the aforementioned signal light outgoing-radiation section being what carries out the outgoing radiation of the signal light from the edge of the layer of the aforementioned waveguide.
[Claim 6] The signal light incidence section which bears the incidence of signal light, and the signal light outgoing-radiation section which bears the outgoing radiation of signal light, It has the stratified waveguide which diffuses the signal light by which incidence was carried out from the aforementioned signal light incidence section, and is spread among the aforementioned signal light outgoing-radiation section. The optical bus which is what draws the light by which incidence was carried out from [where the aforementioned signal light incidence section intersects the field where the layer of the aforementioned waveguide spreads] incidence in this waveguide, And the electronic circuitry which generates the signal which makes the signal light by which an outgoing radiation is carried out from the signal light outgoing-radiation edge which carries out an outgoing radiation, and this signal light outgoing-radiation edge support signal light, At least one side of the electronic circuitries which perform signal processing based on the signal which the signal light which carried out incidence from the signal light incidence edge which carries out incidence of the signal light, and this signal light incidence edge supports is carried. The information processor characterized by having the circuit board of two or more sheets arranged at the status that the aforementioned signal light outgoing-radiation edge or the aforementioned

signal light incidence edge is combined with the aforementioned optical bus in the aforementioned signal light incidence section or the aforementioned signal light outgoing-radiation section.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the information processor which performs signal processing using the optical bus which transmits optically two or more signals between the circuit boards, and its optical bus.
[0002]
[Description of the Prior Art] By development of a VLSI (VLSI), the circuit function of the circuit board (daughter board) used with data processing system has increased sharply. Since the number of signal connection to each circuit board increases as a circuit function increases, the parallel architecture for which the data bus board (mother board) which connects between each circuit board by the bus structure also needs many connection connectors and path cords has been adopted. Although enhancement in the working speed of a parallel bus has been achieved by promoting parallelization by multilayering and detailed-izing of a path cord, the processing speed of a system may be restricted by the working speed of a parallel bus by the signal retardation resulting from the capacity between connection wirings, or connection wiring resistance. moreover, the electromagnetism by high-density-izing of a parallel bus connection wiring -- the problem of a noise (EMI:Electromagnetic Interference) also serves as the big constraint to the enhancement in processing speed of a system
[0003] In order to solve such a problem and to aim at enhancement in the working speed of a parallel bus, using the system intrinsic-light connection technique called optical interconnection is examined. Between each circuit board is connected to Chapter 6 of "Christopher et.al, "Optical Interconnection Foundations and Applications", Artech House Inc., Boston London, 1994" which were published in Britain in 1994 by one optical fiber, and the interface of each circuit board has the publication about the example which consisted of a light emitting device, a photo detector, and a parallel-serial conversion circuit in it. Here, it connects by 32-bit parallel electrical-and-electric-equipment bus, and the electronic circuitry on the circuit board is assumed to be about 50MHz in the clock time. For this reason, it is required that the parallel-serial conversion circuit between a parallel electrical-and-electric-equipment bus and a serial light bus operates by about 2.7GHz.
[0004] Thus, in changing a parallel electrical signal into a serial lightwave signal and connecting between the circuit boards by the optical fiber, it decides the data transmission rate of a bus by the working speed of a parallel-serial conversion circuit, and when the number of bits of an electronic circuitry increases to 64 more bits or 128 bits, there is a problem that it is difficult to raise a data transmission rate according to it. In order to raise a data transmission rate, when it is going to gather the working speed of a parallel-serial conversion circuit, while an expensive electronic circuitry is needed, the power consumption in a parallel-serial conversion circuit increases by leaps and bounds.
[0005] In addition, the example which applied the optical-transmission method which used the high speed and photogenesis/light-receiving device of a high sensitivity to the data bus is indicated by JP,2-41042,A, photogenesis/light-receiving device is arranged to front reverse both sides of each circuit board, and the in-series light data bus for the loop transmission between

each circuit board which combined spatially between photogenesis/light-receiving devices on the adjoining circuit board included in the system frame with light is proposed there.
[0006] Light / electric conversion is carried out by the circuit board which the signal light sent from a certain circuit board of one sheet adjoins in this method, and the electrical and electric equipment / optical conversion is further carried out once again by the circuit board, and it is transmitted among all the circuit boards included in the system frame, repeating light / electric conversion, and the electrical and electric equipment / optical conversion on each circuit board so that it may say that signal light is sent to the circuit board which adjoins a degree. For this reason, a signal-transduction speed receives the constraint at the same time it is dependent on the light / electric conversion rate of light-receiving/photogenesis device, and the electrical and electric equipment / optical conversion rate arranged on each circuit board. Moreover, since the optical coupling by light-receiving/photogenesis device arranged on each circuit board between which free space was made to be placed is used, it is necessary to perform optical position doubling of light-receiving/photogenesis device arranged at adjoining circuit board table reverse both sides, and for all the circuit boards to have joined together optically for the data transmission between each circuit board.
[0007] Furthermore, since optical coupling of each circuit board is carried out through free space, the interference (cross talk) between the adjoining optical data transmission lines occurs, and a poor transmission of data is expected. Moreover, when signal light is scattered about according to the environment in a system frame, for example, dust etc., it is also expected that a poor transmission of data occurs. Furthermore, since each circuit board is connected in series, when one of the circuit boards are removed, the excessive circuit board for compensating it which connection will not ******** there is needed. That is, the desorption of the circuit board cannot be carried out freely, but there is a problem that the number of the circuit boards will be fixed.
[0008] The optical data transmission technique between the circuit boards in which the free space other than the above-mentioned method was used is indicated by JP,61-196210,A. The technique indicated here is a method which has the 2nd parallel page, which possesses the plate counterposed by the light source and was constituted by the diffraction grating arranged on the plate front face, and the reflective element and which combines between the circuit boards optically through the optical path using free space. In this method, it cannot transmit to one point which had the light emitted from one point fixed, but between [no] the circuit boards can be comprehensively connected like an electric bus. Moreover, since free space is used, complicated optical system is needed, since position doubling etc. is difficult, the interference (cross talk) between the optical data transmission lines which originate and adjoin a position gap of an optical element occurs, and a poor transmission of data is expected. Moreover, since the initial entry between the circuit boards is determined by the diffraction grating and reflective element which have been arranged on the plate front face, it cannot carry out the desorption of the circuit board freely, but has the problem that the correspondence nature to a system change is low.
[0009]
[Problem(s) to be Solved by the Invention] the situation of the above [this invention] -- taking an example -- a cross talk and electromagnetism -- there are few noises, position doubling is easy, and it aims at offering the optical bus which can carry out the desorption of the circuit board freely, and the information processor which performs signal processing using the optical bus
[0010]
[Means for Solving the Problem] The signal light incidence section among which the optical bus of this invention which attains the above-mentioned purpose bears the incidence of signal light, It is the optical bus equipped with the signal light outgoing-radiation section which bears the outgoing radiation of signal light, and the stratified waveguide which diffuses the signal light by which incidence was carried out from the signal light incidence section, and is spread among the signal light outgoing-radiation section. The signal light incidence section is characterized by being what draws the light by which incidence was carried out from [which intersects the field where

the layer of a waveguide spreads] incidence in this waveguide.
[0011] Here, two or more layers are superimposed on the above-mentioned waveguide, and it may change. It is that of which two or more layers are superimposed on the above-mentioned waveguide, and it consists. moreover, and the above-mentioned signal light incidence section So that the waveguide located in an upper layer side rather than the waveguide located in a lower layer side may permit the transit of signal light by which incidence is carried out to the waveguide located in the orientation lower layer side of incidence among two or more signal light by which incidence is carried out to each waveguide on which two or more layers were superimposed from [above-mentioned] incidence It is formed stair-like and you may change.
[0012] Moreover, two or more layers may be superimposed on the above-mentioned waveguide, it may change, and you may have the transit way which passes the signal light which was drilled in the waveguide to which the above-mentioned signal light incidence section is located in the above-mentioned orientation upper layer side of incidence, and by which incidence is carried out to the waveguide located in the orientation lower layer side of incidence. Furthermore, the above-mentioned signal light outgoing-radiation section may carry out the outgoing radiation of the signal light from the edge of the layer of the above-mentioned waveguide.
[0013] Moreover, the information processor of this invention which attains the above-mentioned purpose The signal light incidence section which bears the incidence of signal light, and the signal light outgoing-radiation section which bears the outgoing radiation of signal light, It has the stratified waveguide which diffuses the signal light by which incidence was carried out from the above-mentioned signal light incidence section, and is spread among the signal light outgoing-radiation section. The optical bus which is what draws the light by which incidence was carried out from [where the above-mentioned signal light incidence section intersects the field where the layer of the above-mentioned waveguide spreads] incidence in the waveguide, And the electronic circuitry which generates the signal which makes the signal light by which an outgoing radiation is carried out from the signal light outgoing-radiation edge which carries out an outgoing radiation, and a signal light outgoing-radiation edge support signal light, At least one side of the electronic circuitries which perform signal processing based on the signal which the signal light which carried out incidence from the signal light incidence edge which carries out incidence of the signal light, and the signal light incidence edge supports is carried. It is characterized by having the circuit board of two or more sheets arranged at the status that the above-mentioned signal light outgoing-radiation edge or the above-mentioned signal light incidence edge is combined with the above-mentioned optical bus in the above-mentioned signal light incidence section or the above-mentioned signal light outgoing-radiation section.
[0014]
[Embodiments of the Invention] Hereafter, the operation gestalt of this invention is explained. Drawing 1 is a schematic diagram of the 1 operation gestalt of an information processor which used the optical bus and its optical bus of this operation gestalt. As shown in drawing 1 , the information processor 100 of this operation gestalt is equipped with two or more circuit boards 120a, 120b, and 120c and ... which were optically combined with the optical bus 101 and the optical bus 101.
[0015] To each circuit boards 120a, 120b, and 120c and ... The electronic circuitry 123 which generates the signal which makes the signal light outgoing-radiation edges 130a, 130b, and 130c which carry out an outgoing radiation, ... and the signal light outgoing-radiation edges 130a, 130b, and 130c, and the signal light by which an outgoing radiation is carried out from ... support signal light, Signal light At least one side of the electronic circuitries 123 which perform signal processing based on the signal which the signal light incidence edges 140a, 140b, and 140c which carry out incidence, ... (not shown [a part]) and the signal light incidence edges 140a, 140b, and 140c, and the signal light that carried out incidence from ... support is carried.
[0016] The optical bus 101 is superimposed on the waveguides 111a, 111b, and 111c of two or more layers, and ..., and is formed. Each waveguides 111a, 111b, and 111c of the optical bus 101 and ... have the signal light incidence section (not shown) and the signal light outgoing-radiation section (not shown), respectively. These signals light incidence section is combined with each circuit boards 120a, 120b, and 120c, the signal light outgoing-radiation edges 130a, 130b, and

130c of ..., and ... And these signals light outgoing-radiation section is combined with each circuit boards 120a, 120b, and 120c, the signal light outgoing-radiation edges 140a, 140b, and 140c of ..., and ... (not shown [a part]).
[0017] Signal light outgoing-radiation edge 130a changes the electrical signal from circuit board 120a into a lightwave signal, and carries out incidence of the changed signal light to the waveguides 111a, 111b, and 111c and each signal light incidence section of ... which were formed in the optical bus 101. Waveguides 111a, 111b, and 111c and the signal light to which incidence of ... was carried out from the signal light incidence section are diffused and spread. waveguides 111a, 111b, and 111c and each signal light outgoing-radiation section of ... waveguides 111a, 111b, and 111c and ... inside is spread and an outgoing radiation is carried out to signal light incidence edge 140a of circuit board 120a from the edge of waveguides 111a, 111b, and 111c and the layer of ... The signal light by which incidence was carried out to signal light incidence edge 140a of circuit board 120a is changed into an electrical signal, and is transmitted to the electronic circuitry 123 of circuit board 120a. The signal light outgoing-radiation edges 130b and 130c and ... also have the same function as the above-mentioned signal light outgoing-radiation edge 130a, and the signal light incidence edges 140b and 140c and ... also have the same function as the above-mentioned signal light incidence edge 140a. About the detail of the signal light incidence section by the side of an optical bus, and the signal light outgoing-radiation section, it mentions later.
[0018] the information processor 100 constituted as mentioned above -- two or more circuit boards 120a, 120b, and 120c and ... mutual is connected optically and the signal transmission between the circuit boards is performed quickly Since each [these] circuit boards 120a, 120b, and 120c and ... are mutually connected in parallel to the optical bus 101, even if it takes out and inserts a certain circuit board, other circuit boards are not affected.
[0019] Drawing 2 is a schematic diagram of the optical bus used for the information processor of drawing 1 . As shown in drawing 2 , the optical bus 101 has the stratified waveguides 111a, 111b, and 111c, the ... and clad layers 112a, 112b, and 112c, and the laminated structure superimposed on ... by turns. Thus, as for waveguides 111a, 111b, and 111c and ..., both sides of a layer are covered with the clad layers 112a, 112b, and 112c and ..., and signal light is constituted so that it may be spread in the status that it was shut up in the layer of a waveguide.
[0020] The material with a refractive index higher than the material of a clad layer with a light transmission high as a material for waveguides is used, and, on the other hand, the material with a refractive index lower than the material for waveguides as a material for clad layers is used. For example, when a polymethylmethacrylate is used for waveguides, the fluorine polymer with a refractive index lower than a polymethylmethacrylate etc. is used for clad layers.
[0021] Drawing 3 is a schematic diagram of other examples of the optical bus used for the information processor of drawing 1 . As shown in drawing 3 , cutoff layer 113a is inserted between waveguide 111a inserted into this optical bus 101' between clad layer 112a and clad layer 112b, and waveguide 111b inserted between clad layer 112c and 112d of clad layers. Similarly, cutoff layer 113b is inserted between waveguide 111b into which both sides were inserted by the clad layer, respectively, and waveguide 111c. A cutoff layer is inserted similarly between the waveguides which adjoin mutually [the following].
[0022] Thus, by arranging the cutoff layers 113a, 113b, and 113c and ... between the waveguides which adjoin mutually, the signal light which leaked and came out out of the waveguide passing also through a clad layer, and entering into the adjoining waveguide layer is prevented, and, thereby, it can reduce sharply the cross talk of the signal between each waveguide layer. As a material for cutoff layers, a metal thin film, optical impermeability plastics, or the material that absorbs light is used.
[0023] Drawing 4 is a ** type view showing the connection status between each part of the information processor of drawing 1 . As shown in drawing 4 , the information processor 100 is equipped with the optical bus 101 and the circuit board 120. The parallel electrical signal sent via the bus line (not shown) on the circuit board 120 from each electronic circuitry (not shown) on the circuit board 120 is inputted into the signal light outgoing-radiation edge 130 of the circuit board 120 by the electrical wiring 124 as shown in drawing 4 . The signal light outgoing-radiation

edge 130 consists of the light-emitting-device drive circuit 131 and the light emitting device 132, and the light-emitting-device drive circuit 131 carries out the electrical and electric equipment / optical conversion of the transmitted parallel electrical signal for every bit. A light emitting device 132 turns to the optical bus 101 the signal light S1, S2, and S3 and ... by which the electrical and electric equipment / optical conversion was carried out, and carries out an outgoing radiation.

[0024] The optical bus 101 is equipped with the waveguides 111a, 111b, and 111c of two or more layers, and ..., and both sides of each waveguides 111a, 111b, and 111c and the layer of ... are covered with the clad layers 112a, 112b, and 112c and ... Waveguides 111a, 111b, and 111c and each class of ... correspond to 1 bit each of signal light, respectively. Waveguides 111a, 111b, and 111c and ... are equipped with the signal light incidence section 133, respectively.

[0025] The signal light S1, S2, and S3 and ... by which the outgoing radiation was carried out from the light emitting device 132, and incidence was carried out in the orientation (the orientation of arrow head A) which intersects waveguides 111a, 111b, and 111c and the field where the layer of ... spreads It is reflected in the orientation of arrow head B parallel to the field where waveguides 111a, 111b, and 111c and each class of ... spread by 133s of the inclined planes cut aslant prepared in the signal light incidence section 133, and the inside of waveguides 111a, 111b, and 111c and each layer of ... is spread. Thus, waveguides 111a, 111b, and 111c and the whole region in a layer of ... can be made full of the signal light S1, S2, and S3 and ... by forming a reflector, the diffusing surface, or the diffraction grating in the signal light incidence section 133.

[0026] An outgoing radiation is carried out out of a layer from the signal light outgoing-radiation section 134 by which the edge 136 of the layer of each waveguide was equipped with the signal light S1, S2, and S3 which spread the inside of each waveguide layer, and ..., and the signal light incidence edge 140 which consists of the photo detector 142 and the photo-detector drive circuit 141 which were attached in the circuit board 120 is arrived at. The photo detector 142 and the photo-detector drive circuit 141 are formed corresponding to waveguides 111a, 111b, and 111c and each class of ..., and it corresponds to the signal light which is 1 bit of each which these waveguides each class spreads. After the signal light S1, S2, and S3 and ... which were received by the photo detector 142 are changed into an electrical signal by the photo-detector drive circuit 141, it is transmitted to each electronic circuitry (not shown) carried on the circuit board 120 via the electrical wiring 125 and the electric bus line (not shown).

[0027] Drawing 5 is a ** type view having shown the optical bus of the information processor shown in drawing 4 in three dimensions. As shown in drawing 5 , two or more stairway sections 150 by which each waveguides 111a, 111b, and 111c and the signal light incidence section 133 of ... were formed in the position corresponding to the signal light outgoing-radiation edge 130 (refer to the drawing 4) of each circuit board stair-like are formed in the optical bus 101. Below, the stairway section 150 is explained, referring to the drawing 4 and the drawing 5 . Two or more signal light S1, S2, and S3 by which incidence is carried out to each stairway section 150 from incidence at each waveguides 111a, 111b, and 111c and ... (the orientation of arrow head A), the inside of ..., For example, waveguides 111a, 111b, and 111c and each signal light incidence section 133 of ... are formed stair-like so that waveguide 111b located in an upper layer side rather than waveguide 111a may permit the transit of the signal light S1 by which incidence is carried out to waveguide 111a located in the orientation lower layer side of incidence. Among each signal light incidence section 133 of this stairway section 150 As shown in drawing 4 , it is cut aslant and 133s of the inclined planes where plating was given to the rear-face side is formed. the signal light S1, S2, and S3 and ... by which the outgoing radiation was carried out in the orientation of arrow head A reflect in the orientation of arrow head B from the signal light outgoing-radiation edge 130 by 133s of the inclined planes of this signal light incidence section 133 -- having -- waveguides 111a, 111b, and 111c and ... it is introduced inside

[0028] Thus, the ground [that shall draw in a waveguide the light by which incidence was carried out in the signal light incidence section in this operation gestalt from / which intersects a waveguide road surface / incidence (the orientation of A), and the signal light outgoing-radiation section shall carry out the outgoing radiation of the signal light from the edge 136 of the layer of a waveguide (in the orientation of B)] is explained below. Usually, since the layer thickness of

the waveguide which transmits light is the very thin thickness of several microns to about some dozens of microns, the size of the signal light incidence section of a waveguide layer and the signal light outgoing-radiation section is also formed in a detailed size. Therefore, in case an optical bus and the circuit board are connected, position doubling of an optical bus and the circuit board must be performed with high degree of accuracy so that exact connection may be optically made for the signal light incidence section by the side of an optical bus and the signal light outgoing-radiation section, and the signal light outgoing-radiation edge by the side of the circuit board and a signal light incidence edge. And from practical use, highly precise position doubling must be what can be easily attained by easy operation.

[0029] Then, with this operation gestalt, the orientation of incidence and the orientation of an outgoing radiation of signal light are made into mutually different orientation like [the orientation of A and the orientation of an outgoing radiation of signal light which intersect a waveguide road surface in the orientation of incidence of signal light] orientation parallel to a waveguide road surface of B as mentioned above. Therefore, if one [any or] position doubling is performed among position doubling of the signal light incidence section, and position doubling of the signal light outgoing-radiation section, position doubling of another side will be attained automatically.

[0030] That is, as shown in drawing 4 , the concavity 135 of the number of layers of a waveguide and the same number formed of the clad layer and the waveguide layer is formed in the signal light outgoing-radiation section 134 with which the edge 136 of the optical bus 101 which counters with the signal light incidence edge 140 of the circuit board 120 was equipped. In case the circuit board 120 is connected to the optical bus 101, optical connection between the light emitting device 132 by the side of the circuit board 120 in the signal light outgoing-radiation edge 130 and the signal light incidence section 133 by the side of the optical bus 101 is automatically made by carrying out position doubling of these concavities 135 by the side of the optical bus 101, and the photo detector 142 by the side of the circuit board 120.

[0031] Thus, exact position doubling of the optical bus 101 and the circuit board 120 can be realized very easily by considering as mutually different orientation so that it may say that the orientation of position doubling by the side of the signal light incidence edge 140 is made into the orientation (the orientation of arrow head A) which intersects the waveguide road surface of the optical bus 101, and the orientation of position doubling by the side of the signal light outgoing-radiation edge 130 is made into orientation (the orientation of arrow head B) parallel to the waveguide road surface of the optical bus 101.

[0032] Moreover, it is effective, when raising the performance of an optical bus, since the degree of freedom of the layout design of the signal light outgoing-radiation section of the optical bus 101 and the signal light incidence section increases by making the orientation of position doubling of the signal light outgoing-radiation section and the signal light incidence section into different orientation. In addition, although the orientation of position doubling by the side of the signal light incidence edge 140 is made into the orientation which intersects a waveguide road surface and the orientation of position doubling by the side of the signal light outgoing-radiation edge 130 is made into orientation parallel to a waveguide road surface with this operation gestalt, this is because the direction of position doubling by the side of the signal light incidence edge 140 needs a precision higher than position doubling by the side of the signal light outgoing-radiation edge 130.

[0033] Next, the 2nd operation gestalt of the information processor of this invention is explained. Drawing 6 is a ** type view showing the connection status between each part of the information processor in the 2nd operation gestalt. As shown in drawing 6 , the information processor 200 of this operation gestalt is equipped with layers [two or more] waveguides 211a, 211b, and 211c, ... and the clad layers 212a, 212b, and 212c, and the optical bus 201 by which it was superimposed on ... at the circuit board 120 and the interior.

[0034] The fraction into which the information processor 200 of this operation gestalt is different from the 1st operation gestalt (refer to the drawing 4) is only the signal light incidence section 220 of the optical bus 201. The signal light incidence section 220 in this operation gestalt consists of the transit ways 221a, 221b, and 221c and ... which pass signal light and the optical induction 222a, 222b, and 222c, and ... In clad layer 212a of the best layer of the optical bus 201

Transit way 221a for passing the waveguides 211a, 211b, and 211c located in the lower layer side of orientation A of incidence of signal light and the signal light by which incidence is carried out to ... is drilled. Transit way 221b which passes the waveguides 211b and 211c located in the lower layer side of orientation A of incidence of signal light and the signal light by which incidence is carried out to ... is drilled in waveguide 211a of the 2nd layer, and clad layer [3rd] layer 212b, and transit way 221c and ... are drilled in them like the following. It is these transit ways 221a, 221b, and 221c and the hole to which ... penetrates waveguides 211a, 211b, and 211c, each class of ... and the clad layers 212a, 212b, and 212c, and ..., and the wall surface of the breakthrough of each waveguide is coated with optical cutoff material so that the signal light in a layer may not be revealed out of a layer.

[0035] The signal light by which incidence is carried out from arrow head A reaches waveguides 211a, 211b, and 211c, the optical induction 222a, 222b, and 222c prepared for each class of ..., and ... through the transit ways 221a, 221b, and 221c and ... The cone-like reflector is formed in the optical induction 222a, 222b, and 222c and ..., and the signal light by which incidence was carried out is reflected the whole surface within an arrow head B-B' side.

[0036] In addition, the signal light outgoing-radiation edge 130 which consists of the light-emitting-device drive circuit 131 with which the circuit board 120 was equipped, and the light emitting device 132, the signal light incidence edge 140 which consists of the photo detector 142 and the photo-detector drive circuit 141 with which the circuit board 120 was equipped, the signal light outgoing-radiation section 134 with which the edge 136 of the optical bus 201 was equipped, and the concavity 135 formed in the edge 136 are the same as that of the thing in the 1st operation gestalt (refer to the drawing

[0037] Since the information processor 200 is constituted in this way, in case the circuit board 120 is connected to the optical bus 201, optical connection between the light emitting device 132 by the side of the circuit board 120 in the signal light outgoing-radiation edge 130 and the signal light incidence section 220 by the side of the optical bus 201 is automatically made by carrying out position doubling of the concavity 135 by the side of the optical bus 201, and the photo detector 142 by the side of the circuit board 120.

[0038] Next, the 3rd operation gestalt of the information processor of this invention is explained. Drawing 7 is a perspective diagram showing the 3rd operation gestalt of this invention. This operation gestalt is an example at the time of using the light-emitting-device array of the planar structure as a light emitting device of the signal light outgoing-radiation edge of the circuit board. As shown in drawing 7 , the optical bus 301 is superimposed on the stratified waveguides 311a, 311b, 311c, and 311d, ... and the clad layers 312a, 312b, 312c, and 312d, and ... two or more layers, and is formed.

[0039] The four stairway sections 350a, 350b, 350c, and 350d similar to the configuration of the stairway section 150 shown in the drawing 4 and the drawing 5 are formed in the optical bus 301, and the circuit board is connected to these stairway sections 350a, 350b, 350c, and 350d, respectively. Stairway section 350a is constituted [form / stair-like / 311d of each signal light incidence section 333 / 311 c / 311 b / waveguide 311a and / of four layers]. Similarly, the following stairway section 350b is constituted by forming the signal light incidence section 333 of each waveguide of four layers as follows which follows 311d of waveguides stair-like. The same is said of the following stairway sections 350c and 350d.

[0040] 333s of the same inclined planes as the signal light incidence section 133 shown in the drawing 4 and the drawing 5 cut aslant is formed in the signal light incidence section 333 of each stairway sections [each / 350a, 350b, 350c, and 350d] waveguide of four layers. The light-emitting-device array 320 is arranged by the stairway sections [these / 350a, 350b, 350c, and 350d] upper part. Four lines, the laser light emitting devices 321a, 321b, 321c, and 321d of a total of 16 pieces, and ... are arranged by four trains in the orientation of X, and are arranged in the shape of an array in the orientation of Y by this light-emitting-device array 320. Several 16 of the laser light emitting devices 321a, 321b, 321c, and 321d and ... corresponds to the number of bits in which this optical bus carries out a parallel transmission.

[0041] The signal light S1, S2, and S3 and S4 are irradiated toward stairway section 350a, respectively from four laser light emitting devices 321a, 321b, 321c, and 321d located in a line in

the orientation of X among the laser light emitting devices 321a, 321b, 321c, and 321d and ... Similarly, the signal light from four laser light emitting devices located in a line in the next orientation of X is irradiated by stairway section 350b. The same is said of the following and stairway sections 350c and 350d.
[0042] The signal light S1, S2, and S3 after the signal light S1, S2, and S3, S4, and ... were irradiated by the signal light incidence section 333 of each stairway sections [each / 350a, 350b, 350c, and 350d] waveguide, S4, and the behavior of ... are the same as the behavior of the signal light in the drawing 4 and the drawing 5 . Thus, by shifting stairway structure not in class and forming it four steps at a time, the light-emitting-device array of the planar structure can be used as light source, and optical position doubling of each light emitting device and each waveguide can be similarly performed easily in the operation gestalt shown in the drawing 4 and the drawing 5 also by this case.
[0043] In addition, it is good also as constituting an information processor combining the optical bus equipped with the signal light incidence section which consists of a transit way and optical induction which show the above light-emitting-device arrays of the planar structure in drawing 6 . By the way, with each above-mentioned operation gestalt, although the example using a polymethylmethacrylate as a material for waveguides was explained, the material for waveguides is not limited to the above-mentioned material, and if they are materials which have light-transmission nature, such as plastic material, such as a quartz system glass material and polystyrene, and a polycarbonate, it can use any materials.
[0044] The optical waveguide which has the ******** effect can be formed by selecting the parvus material of a refractive index from the material for waveguides as a material for clad layers. Moreover, the material for waveguides is not limited only to a solid-state material, as long as it has the function which shuts up signal light in predetermined space, it may use a liquid or a gas as the medium for waveguides, may hold it in a predetermined container, and may form a waveguide.
[0045] In addition, although the example for which two or more layers are superimposed on a waveguide, and it constitutes the optical bus from each above-mentioned operation gestalt was explained, this invention may not necessarily be limited to the optical bus by which two or more layers were superimposed on the waveguide, and may be an optical bus [try] whose waveguide is the much more.
[0046]
[Effect of the Invention] Since other signal light does not enter into the waveguide which spreads one signal light according to the optical bus and information processor of this invention as explained above, the cross talk of the signal light with other waveguides does not occur. moreover, electromagnetism since the optical transmission of the signal is carried out in an optical bus, so that in an electric bus -- a noise does not occur
[0047] Moreover, since exact optical connection between the signal light outgoing-radiation edge of the circuit board and the signal light incidence section of an optical bus is automatically made by carrying out position doubling of the edge by the side of the signal light outgoing-radiation section of an optical bus, and the signal light incidence edge of the circuit board, position doubling of an optical bus and the circuit board becomes easy. Moreover, since it connects in parallel to an optical bus and it does not affect other circuit boards even if each circuit board takes out and inserts the circuit board, it can be doubled with change of a system and can carry out the desorption of the circuit board freely.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the schematic diagram of the 1 operation gestalt of the information processor of this operation gestalt.
[Drawing 2] It is the schematic diagram of the optical bus used for the information processor of drawing 1 .
[Drawing 3] It is the schematic diagram of other examples of the optical bus used for the information processor of drawing 1 .
[Drawing 4] It is the ** type view showing the connection status between each part of the information processor of drawing 1 .
[Drawing 5] It is the ** type view having shown the optical bus of the information processor shown in drawing 4 in three dimensions.
[Drawing 6] It is the ** type view showing the connection status between each part of the information processor in the 2nd operation gestalt.
[Drawing 7] It is the perspective diagram showing the 3rd operation gestalt of this invention.
[Description of Notations]
100 Information Processor
101,101' Optical bus
111,111a, 111b, 111c, ... Waveguide
120,120a, 120b, 120c, ... Circuit board
130 Signal Light Outgoing-Radiation Edge
133 Signal Light Incidence Section
133s Inclined plane
134 Signal Light Outgoing-Radiation Section
136 Edge
140 Signal Light Incidence Edge
150 Stairway Section
200 Information Processor
201 Optical Bus
211a, 211b, 211c, ... Waveguide
220 Signal Light Incidence Section
221a, 221b, 221c, ... Transit way
222a, 222b, 222c, ... Optical induction

[Translation done.]

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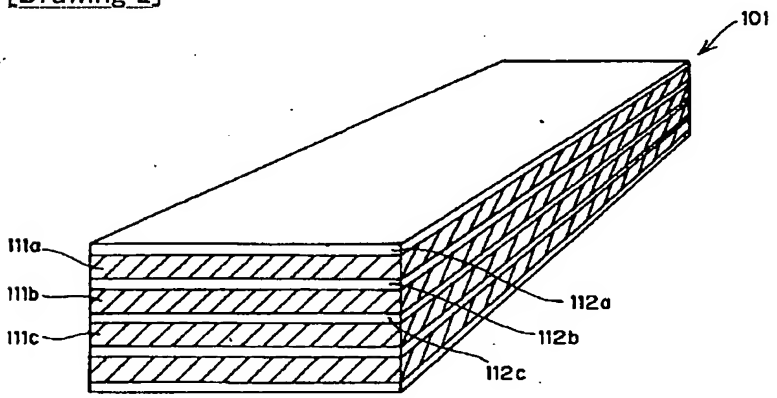
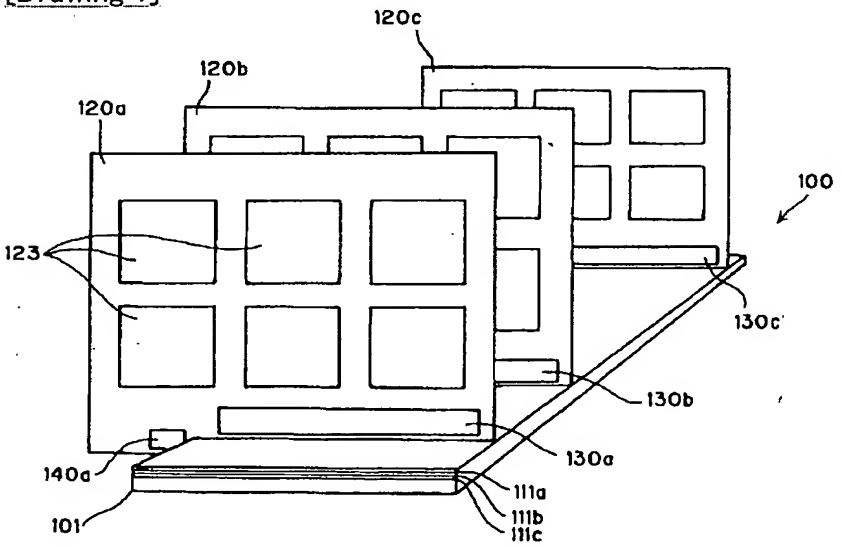
DRAWINGS

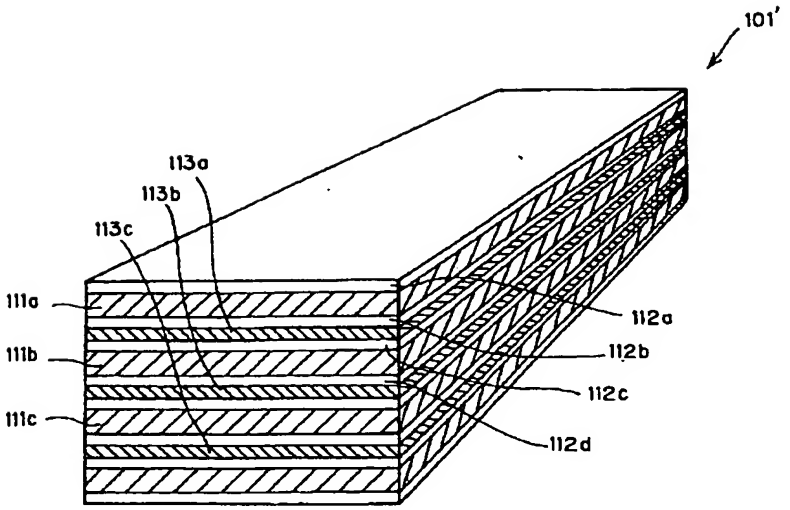
[Drawing 2]



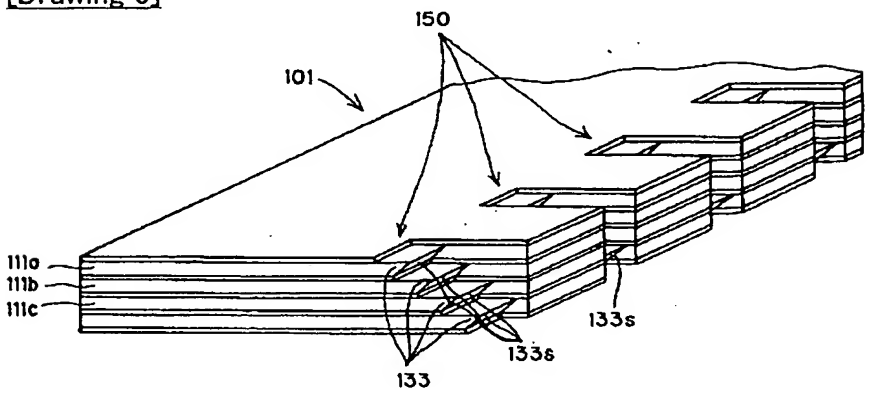
[Drawing 1]



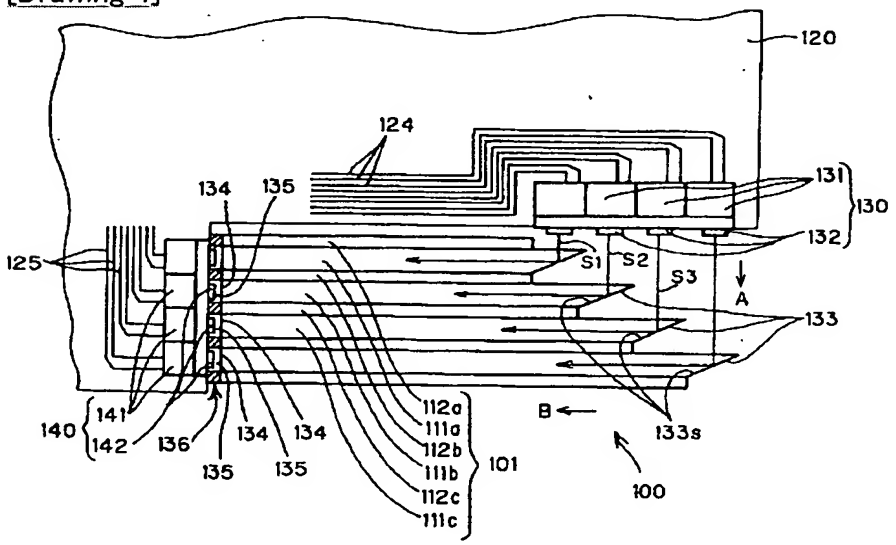
[Drawing 3]



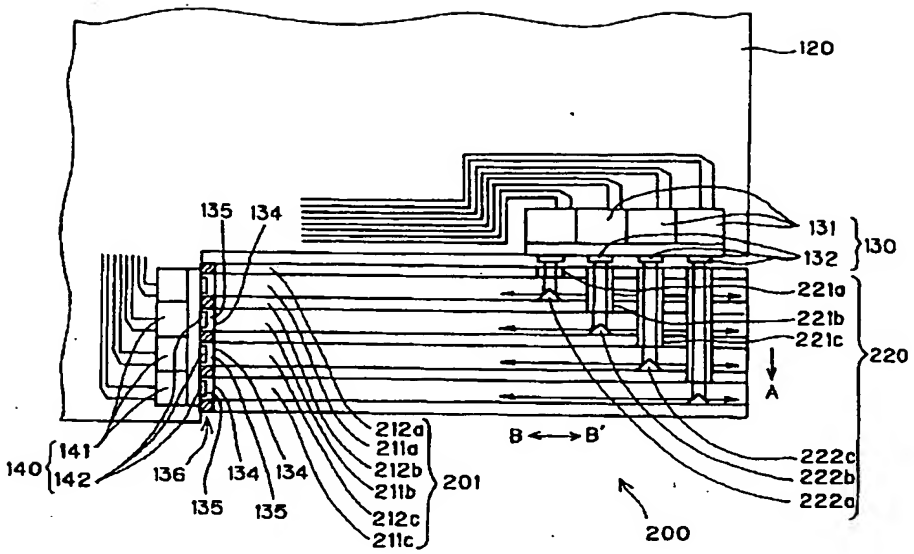
[Drawing 5]



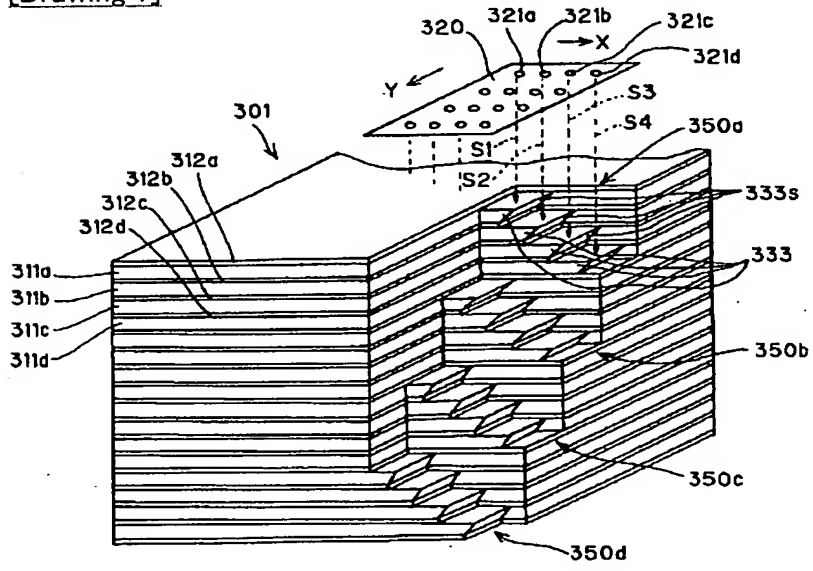
[Drawing 4]



[Drawing 6]



[Drawing 7]



[Translation done.]